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Modeling of the extreme kinematics and nonlinear properties of freak waves obtained through energy focusing (Co-authors: C Fochesato & S Grilli)

Directional wave energy focusing in space is one of the mechanisms that may contribute to the generation of a rogue wave in the ocean. We study here the generation of extreme waves in a three-dimensional numerical wave tank from the motion of a snake wavemaker. The numerical model solves the incompressible fully nonlinear free-surface Euler equations for potential flow, using a high-order Boundary Element Method and a mixed Eulerian-Lagrangian time updating. The implementation of the Fast Multipole Algorithm has recently improved the computational efficiency of the spatial solver. A typical case of a breaking rogue wave is presented with a description of the particular geometry of such a wave, as well as results for the kinematics. The influence of the water depth and the maximum direction of the incident waves is discussed.

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